

GEORGETOWN UNIVERSITY
Department of Chemistry
General Chemistry I - Summer 2020

General Information for CHEM 001 and CHEM 009

Prof. Diana C. Glick (Lecture and Lab)	Prof. Milena Shahu (Lab)
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Office Hours: by appointment	Office Hours: by appointment

Course structure: Lecture/Recitation MTWTh 8:10 - 11:25 AM (meet in same room)
Scheduled Quizzes MTWand/orTh 11:00-11:25 AM
Laboratory MTWTh 12:10 - 2:45 PM

Lab, Chem 009, is a separate course. Concurrent registration in Chem 001 and Chem 009 is required, except with permission from the instructor.

Required Books: Chemical Principles The Quest for Insight 7th Edition by Atkins, Jones, and Laverman

Laboratory Experiments Chemistry the Central Science 8th Custom Edition for Georgetown University by Nelson, Kemp and Lufaso

Online homework through Sapling Learning is also required.
The online homework is worth points toward your grade in the course.

The course will emphasize both assigned reading/problem solving from the textbook and lecture material. Selected handouts will be provided as supplements to the textbook or laboratory manual as required. An online homework program will be utilized to give you more practice answering questions and solving problems. It is understood that students will behave with the utmost respect for academic integrity in all aspects of this course.

Objectives: Every material thing around you, on this Earth and throughout the universe is made of atoms. Our main objectives in this course is to:

- Understand atomic structure and how this structure governs the characteristics of atoms as well as how and why atoms combine to form compounds.
- Understand the solid, liquid and gas phases, how they form and why.
- Understand what drives change (why do atoms rearrange to form new substances?)
- See connections between experiments, conclusions and explanations.
- Build analytical problem solving skills.

- Develop connections between mathematical problem solving and conceptual meaning.
- Begin the process of the transformation from a container of information to a contributor to human knowledge.

There are three main areas in science that provide the framework for answering questions about our material world: Quantum Mechanics, Thermodynamics and Kinetics. Our goal is to develop your understanding and capabilities in these three frameworks.

Examinations: There will be two exams during the semester and a cumulative final exam. All students are required to take the final exam. The dates for the exams are given on the schedule. There will be **no makeup exams** in this class. If missing an exam is absolutely unavoidable the final exam grade will also count as the missed exam grade. Students who do very poorly on one of their exams, but did not miss an exam, may substitute the final exam grade for the lowest exam grade. Exams will emphasize theory, conceptual understanding and problem solving: there will be multiple choice questions, short answer and problems wherein students are required to show their work.

Quizzes: Quizzes will be given as indicated on the schedule. Quizzes are very important in helping you gauge your success with the material, learn to work quickly and efficiently on problems, as well as encouraging good study habits. No quizzes will be given outside of scheduled class times, but the lowest quiz grade will be dropped so one missed quiz is not a problem. Quizzes will be challenging in order to properly prepare you for exams.

Problem Sets (ungraded): *"It is much easier to find something if you seek it"*

Assigned problems from the text are selected to assist your learning and focus in your reading. Please attempt the problems before lecture on that topic so you are exposed to what it is you need to know. My lectures are only meaningful to you if there is something in them you wish to know. If you have tried the problems in advance then you have some ideas about what to expect in class: this is what we mean by **"come to class prepared to learn"**. Do not arrive blank, ready to be written upon; arrive actively curious and hopefully lecture will be enlightening.

A word of caution: Do not be upset if you cannot immediately make sense of a problem, or you do not understand the answer to the problem in the back of the book. If you are struggling to solve a problem, your mind is working and you are learning ways to piece the information together. This is the actual value to you in taking this course; not the facts you assemble, but your method of learning new, complex ideas. If you rely too heavily on looking up answers before you finish trying it yourself, you will gain a false sense of confidence with the material. It is important to struggle a bit with problem solving, to force yourself to find your own way. This doesn't happen immediately, in fact, we will be working on developing this skill all summer long!

Online Homework with Sapling Learning: These assignments will be worth credit toward your grade in the course. This work is meant to be a learning experience with immediate feedback. Your independent work is graded and recorded by the online program. Online homework is each student's independent work and collaboration is not acceptable. Sign up instructions will be given in class or will come with the purchase of the text from the campus bookstore.

Homework due dates are listed in the Sapling site.

Attendance: Although attendance is not required/graded, it is most highly recommended. Students are responsible for making up any missed work in either lecture or recitation on their own. Makeup sessions are included in the lab schedule. All students that miss a lab must notify the professor in order to attend the makeup session.

Grading: Chemistry can be a very difficult body of material to master and the last thing you need is the added pressure of competing with each other for grades. My goal is to enable each student to learn as much of the subject matter as they can master. Therefore, the grades will be determined by how the scores fit into a fixed grading system, not how they compare with other scores in the class. There will be no scaling of grades.

Laboratory: Students are expected to be prepared for each experiment and obey all safety rules consistently. See the lab guidelines and lab general information handouts for details. Technically the lab is a separate course, CHEM 009. The lab grade is therefore reported to the registrar separately from the lecture grade. All students registered for CHEM 001 must also be registered in CHEM 009 unless they are excused with permission from the instructor.

Grading: Chemistry can be a very difficult body of material to master and the last thing you need is the added pressure of competing with each other for grades. My goal is to enable each student to learn as much of the subject matter as they can master. Therefore, the grades will be determined by how the scores fit into a fixed grading system, not how they compare with other scores in the class. There will be no scaling of grades. Note that an A will represent significant achievement, a very difficult, but certainly not impossible accomplishment.

Assessments

Exam I	20 %
Exam II	20 %
Final exam	30 %
Quizzes	20 %
Online Homework	10 %

Given below are the expected ranges for final grades in the course. If your final average is in this range, you are guaranteed at least the grade indicated.

92.5 % and above	A
89.5-92.4	A-
87.5-89.4	B+
82.5-87.4	B
79.5-82.4	B-
77.5-79.4	C+
72.5-77.4	C
69.5-72.4	C-
67.5-69.4	D+
59.0-67.4	D
below 59 %	F

Feedback: Please feel free to call me at my office, or send me e-mail, any time if you have questions or if you need anything clarified. Obtaining a coherent knowledge of chemistry is one of the first steps toward your goal and I am here to help you in every way possible. So, please let me know how I may serve you best. Work hard and take advantage of all the resources available to you.

YOU ARE REMINDED OF THE PLEDGE YOU HAVE MADE:

In the pursuit of the high ideals and rigorous standards of academic life, I commit myself to respect and uphold the Georgetown University Honor System: To be honest in any academic endeavor, and to conduct myself honorably, as a responsible member of the Georgetown community, as we live and work together.

GOOD LUCK !!! and **ENJOY !!!**

Course Schedule for CHEM 001-10 Summer 2020

Date		Topic	Chapter
1Jun	Mon	Introduction to CHEM 001 Focus 1: Atoms How is the structure of an atom investigated? Millikan Oil Drop Experiment, Rutherford Gold Foil Experiment, Electromagnetic Radiation, Atomic Spectra	1A
2Jun	Tue	Introduction to Quantum Mechanics What are wave functions? Particle in a Box Model	1B-C
3Jun	Wed	Hydrogen-like Atomic Orbitals, Quantum Numbers Quiz 1	1D
4Jun	Thu	Electron Configurations, Periodic Table, Periodicity Quiz 2	1E-1F
8Jun	Mon	Review and discuss topics on Exam 1 Quiz 3	1A-1F
9Jun	Tue	Exam 1 (1A-1E) Naming Compounds	F29-F37
10Jun	Wed	Focus 2: Molecules Ionic vs. Molecular Compounds Molecules: Covalent Bonding and Lewis Structures	2A-2D
11Jun	Thu	What determines the shapes of molecules? VSEPR Theory	2E-2F

		Valence Bond Theory and Hybrid Orbitals Quiz 4	
15Jun	Mon	Molecular Orbital Theory	2G
16Jun	Tue	Focus 3: States of Matter How is a gas recognized? How are its physical properties described quantitatively? Quiz 5	3A-3C
17Jun	Wed	Kinetic Molecular Theory and Real Gases Quiz 6	3D-3E
18Jun	Thu	Intermolecular Forces and Properties of Liquids	3F-3G
22Jun	Mon	Review and discuss topics on Exam 2 Quiz 7	1F, 2A-2G, 3A-3G
23Jun	Tue	Exam 2 (1F, 2A-2G, 3A-3G) How are atoms arranged in solids?	3H
24Jun	Wed	Crystalline Solids, Unit Cells, Calculations Focus 4: Thermodynamics Introduction: Heat and work	3H, 4A-4B
25Jun	Thu	Enthalpy, Thermochemistry, Calorimetry, Hess's Law	4C-4E
29Jun	Mon	Entropy Quiz 8	4F-4H

30Jun	Tue	Gibbs Free Energy Quiz 9	4I-J
1Jul	Wed	Review, catch up, practice, prepare for final exam	
2Jul	Thu	Final Exam 8:15 am – 11:15 am	Cumulative

CHEM 009 General Chemistry Laboratory I

LABORATORY GUIDELINES

BEFORE LAB - Pre Lab Assignment

1. Read the experiment.
2. Complete *all* of the pre-lab questions and write an outline of the lab procedure.
3. Submit your answers to all the pre-lab questions and your outline of the lab procedure to the instructor **at the beginning** of lab. Outlines and pre-lab must be done before lab, therefore no credit will be given if the assignment is done during or after lab.

DURING LAB

1. Place all belongings not necessary for lab in the lockers before entering the lab. You may secure your belongings with your lab drawer lock.
2. Strictly observe all safety rules. Goggles must be worn at all times; noncompliance will result in dismissal from the lab. Shorts, sandals (any sort of open toed shoe) and shirts that expose the abdomen may not be worn in the lab. Please dress appropriately before attending lab. Students without proper clothing will not be allowed in the lab. **Violation of any part of this rule can result in a zero for the lab experiment and a failing grade in the lab course.**
3. Observe good lab technique, e.g. do not cross contaminate reagents, use hoods when specified, be aware of flames, keep work area neat, dispose of hazardous wastes in labeled containers provided, etc. Glass waste may only go to glass waste containers. Other trash is not to be disposed of in glass waste containers. **Poor lab technique will result in point deductions from the lab report.**
4. **Reports are to be written in ink.** All data must be entered into the data sheet for the experiment. Do not obliterate errors, draw a single line through your error and continue on the same report sheet. (i.e. do not erase or scribble out mistakes, do not re-write report sheets, and do not write data on separate sheets of paper)
5. Clean your lab bench and common work areas before leaving the lab. There should be no solids in the sink, all gas jets should be turned off and all your equipment should be replaced in your drawer and your drawer locked. All supplies used during lab must be returned to the work-station bin.
6. Have your instructor sign and date your report sheet when you finish. All data collection must be complete before leaving the lab. Work space clean up must be complete to get your instructor's signature.

AFTER LAB

1. Certain questions at the end of each lab are to be completed and turned in with the lab report. See the lab schedule for these assignments. (Do not confuse this with completing all the pre-lab questions for your pre-lab assignment.)

2. Submitted reports must have all data and calculations. Answers to the questions, graphs, etc., are to be submitted with the corresponding lab report.
3. Along with each lab report each student will submit a reflection/concluding paragraph summarizing certain aspects of the lab:
 - a) Re-state the purpose of the lab.
 - b) Comment on what you learned from the lab experience.
 - c) What specific tasks helped you learn a specific skill/concept?
 - d) What specific lab techniques were learned?
 - e) Comment on systematic and random experimental errors.
(Do not confuse this part with experimenter error.)
 - f) If you repeated this lab what would you do differently?

Lab reports are due no later than the beginning of lab (12:10 PM) according to the due dates on the syllabus. A 5-point deduction will be assessed for each report turned in to the instructor after 12:15. A 10-point deduction will be assessed if the report is a day late. Each subsequent day will cost the lab score 15 points. Lab reports will not be accepted if more than three days late. On “no lab” days, submit lab reports to Dr. Glick by the end of lecture.

Experimental technique during lab is very important and we hope to see your skills improve throughout the semester. Poor technique will be penalized (points will be subtracted from the lab report grade), especially for the contamination of reagents and improper disposal of wastes.

The lab report grade also depends upon the accurate presentation of data graphically. All graphs must be done in Excel. You must, title every graph and all axes must be properly labeled and scaled. If you are unsure how to correctly present your graphical data, please ask! It is all part of your learning process.

Read “CHEM 009 Grading” for important information concerning your evaluation in this course. Any inquiries regarding grades on lab reports, or regrades, must be addressed within 2 days after reports have been returned.

HAVE FUN! Pretend you are the first person ever to do the experiment: think about what the experiment is designed to prove and observe closely as you collect your data. Report your observations, not what you expect to see and draw informed conclusions!

Academic Honesty: ALL STUDENTS ARE EXPECTED TO EXERCISE HONESTY IN THEIR WORK. YOU ARE REMINDED OF THE PLEDGE YOU HAVE MADE:

In the pursuit of the high ideals and rigorous standards of academic life, I commit myself to respect and uphold the Georgetown University Honor System: To be honest in any academic endeavor, and to conduct myself honorably, as a responsible member of the Georgetown community, as we live and work together.

Some examples of dishonest behavior to be rigorously avoided: changing data in lab reports, copying data from another student’s lab report, not contributing to the group on team projects, printing several copies of the same graph, introduction or conclusion and sharing amongst the group, allowing your partner to collect all the data, having one group do half the lab while another group does the other half and then sharing the data. These are actions that I would not expect of any student, but I have observed them in the past. Plan well and be organized so you do not fall into unethical behavior in an attempt to keep up with your course work.

Course Schedule for CHEM 009-10/11 Summer 2020

Date	Exp #	Topic	Questions
1 Jun	-	Check-in, Tour the lab, and Safety rules Students will purchase a lock and goggles from the chemistry stockroom at this time.	-
2 Jun	Handout	Lab safety quiz (P/F) Calibration of Glassware (Due 6/04)	Complete Worksheet
3 Jun	12&S17 Handout	Atomic spectra (Due 6/08) Design a Procedure (Due 6/04)	5&7 & 1-4
4 Jun	Handout	How Many Waters of Hydration in Epsom salt? (Due 6/10)	Complete Worksheet
8 Jun	-	No lab (if you have missed a lab, you must make it up at this time)	-
9 Jun	-	No Lab	-
10 Jun	S27	Determining the Concentration of a Solution: Beer's Law (Due 6/15)	1-6
11 Jun	Handout	Conjugated Dyes PIB Model (Due 6/16)	Complete Worksheet
15 Jun	11	Lewis Structures and VSEPR Model (Due 6/17)	1-6
16 Jun	S39	Properties of Gases (Due 6/18)	1-3
17 Jun	13B	Molar Mass of a Vapor (Due 6/22)	1-9
18 Jun	S47	Intermolecular Forces (Due 6/24)	Complete Worksheet
22 Jun	-	No Lab (if you have missed a lab, you must make it up at this time)	-
23 Jun	-	No Lab	-

24 Jun	S53	Structure of Solids (Due 7/29)	Complete Worksheet
25 Jun	S67	Enthalpy of a Chemical Reaction (Due 7/01)	Formal report
29Jun	-	Lab/Check out if not enrolled in Chem 002/010	-
30Jun	-	No Lab	-
1 Jul	-	No Lab	-
2 Jul		No Lab	-